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Docket No. S-99,952

In Response to Office Action dated July 27, 2007

REMARKS

Claim Status

Claims 1, 4, 5 and 9-13 are currently pending.

Claims 14-19 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) s being drawn to a nonelected invention.

Claim 3 has been canceled without prejudice.

Claim 1 has been amended to specify that the tape consists essentially of an uncoated polycrystalline nickel alloy, that the RMS roughness is less than about 1 nm, that the current density is at least 0.37 amperes per square centimeter, and to include the step of depositing a layer of oriented cubic oxide material onto the metallic tape having a roughness of less than about 1 nm, wherein the in-plane alignment of the oriented cubic oxide material is less than about 7 degrees. Full support for these amendments is found in the specification on page 3, lines 28-29; page 4, lines 22-24; and on page 12, lines 7-10.

Claims 5 and 11 have been amended to specify that the acid bath consists essentially of sulphuric acid and phosphoric acid.

Arguments

1. Rejection under 35 USC § 103(a) over Arendt (U.S. Patent Application 2003/0036483) in view of Rosswag (U.S. Patent 4,372,831).

Claims 1, 3-4, and 13 remain rejected under 35 USC § 103(a) over Arendt in view of Rosswag. Claim 3 has been canceled without prejudice. Applicants traverse this rejection, and offer the following arguments for consideration in light of the current amendments. Applicants have amended claim 1 to include that the RMS roughness is less than about 1 nm, that the current density is at least 0.37 amperes per square centimeter, and to include the step of depositing a layer of oriented cubic oxide material onto the metallic tape having a roughness of less than about 1 nm, wherein the in-plane alignment of the oriented cubic oxide material is less than about 7 degrees.

In regard to claim 1, the Office Action states that "the inclusion of an inert oxide layer in Arendt does not teach away from the instant claimed invention." The Office Action further states

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"the language of 'metal tape that is a polycrystalline metal including nickel' is in 'comprising' language, not 'consisting essentially of' or 'consisting of' language, which would preclude the use of an inert oxide layer. Applicants disagree with the statement that the inclusion of an inert oxide layer in Arendt does not teach away from the instant claimed invention. This issue was fully addressed in the Declaration under 37 C.F.R. 1.132 by Paul Arendt of May 2, 2007, in which it was stated "Arendt '483 paragraphs [0015] and [0016] teach that a metallic substrate can be mechanically polished, electrochemically polished or chemically polished to reduce the RMS roughness, but, even if polished, the inert oxide layer must be deposited to give the substrate a RMS roughness of less than about 2 nm." Arendt clearly teaches that chemical mechanical polishing is necessary to provide a smooth surface, where "smooth" is meant a surface having an RMS roughness of less than 2 nm. Arendt [0016]. Applicants additionally point out that Arendt states that to obtain the desired smoothness [of less than about 1 nm], it can be preferred to treat *the deposited inert oxide layer* by chemical mechanical polishing (emphasis added). Arendt [0016]. Arendt further states that if the metal alloy starts out with an RMS roughness of less than about 15 nm, the metal substrate can be chemically mechanically polished (CMP) to a RMS roughness of about 1.5 nm, and if the metal substrate is much rougher, then the metal substrate is generally mechanically polished. Arendt [0018]. Thus, Arendt '483 clearly did not contemplate that an RMS roughness of less than 1 nm could be obtained by electropolishing alone and without a metal oxide layer being present prior to polishing. For these reasons, Applicants maintain that Arendt teaches away from the presently claimed invention.

In regard to the assertion that the use of an inert oxide layer is not precluded by the claims, Applicants note that with the amendment to claim 1 that the metallic tape consists essentially of an uncoated polycrystalline nickel alloy, the use of an inert oxide layer is precluded.

Also in regard to claim 1, the Office Action asserts that Rosswag teaches that industrial gloss would be obtained at lower current densities and that mirror gloss would be obtained at higher current densities, and that "since current density is a result-effective variable as taught by Rosswag, it would have been obvious to one of ordinary skill in the art ... to electropolish at the desired current density by a routine optimization in order to obtain the desired finish." First, Applicants strongly disagree that Rosswag teaches that current density is a result-effective variable. There is no data to suggest a linear – or any other result-effective - relationship

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between current density and roughness, and thus nothing to suggest that extrapolation to a current density outside the range of 8 – 20 A/dm² is a valid assumption. Rosswag simply teaches the use of an electrolyte solution comprising polyphosphate, at a temperature of 45 - 55°C, with a current density of 8 – 20 A/dm², for a duration of 5 – 10 min. There is no suggestion that higher current densities would result in an RMS roughness of less than 1 nm, and in fact, one of skill in the art might assume that a higher current density would have a detrimental effect on the quality of the metallic surface, for example, due to etching or breakdown thereof. Rosswag teaches obtaining a “mirror gloss” under a specific range of conditions with a specific electrolyte solution. Applicants have fully addressed the meaning that “mirror gloss” would have to one of skill in the art in the Declaration under 37 C.F.R. 1.132 by Paul Arendt of May 2, and maintain that the mere mention of a general term as “mirror gloss” does not teach how to achieve an RMS roughness of less than 1 nm, as required by the amended claims.

Applicants amended claims further require a layer of oriented cubic oxide material must be capable of being deposited onto the metallic tape such that the in-plane alignment of the oriented cubic oxide material is less than about 7 degrees. There is no teaching or suggestion in Rosswag or in any of the references that this would be achievable with the methods known prior to Applicants' invention.

Second, Applicants disagree that the present invention requires only “routine optimization.” Electropolishing is an unpredictable art, subject to a number of interrelated experimental variables. Rosswag teaches one such limited set of variables, including composition of the electrolyte solution, current, time, temperature and base metal. Given the unpredictability and the lack of establishment of a result-effective relationship between any of these variables, the assertion that Applicants' invention results only from routine optimization appears to lack sufficient foundation.

Applicants believe that with these amendments, this rejection is overcome and that in light of the above arguments, Applicants' claimed invention is sufficiently distinguished from the teachings of Rosswag and Arendt. Applicants respectfully request withdrawal of the rejection under 35 USC § 103(a).

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2. Rejection under 35 USC § 103(a) over Glowacki in view of Rosswag (U.S. Patent 4,372,831).

Claims 1, 3-5, 7-8, and 13 were rejected under 35 USC § 103(a) as obvious over Glowacki (*Texture developments in long lengths of NiFe tapes for superconducting coated conductors*, J. of Materials Science, vol. 37, no 1, pp 157-168, Jan. 2002) in view of Rosswag.

In regard to claim 1, the Office Action states that Glowacki does not specify that the bath would be an acid bath, but that Rosswag teaches an acid electrolyte for electropolishing in order to dissolve the surface of the metal. Applicants point out that Rosswag teaches a specific electrolyte solution comprising polyphosphates. Applicants' amended claims, however, specify that the electrolyte consists essentially of sulphuric acid and phosphoric acid, which is not taught by either reference.

Still regarding claim 1, the Office Action states that Glowacki does not specify that the current density would be at least 0.18 amperes per square centimeter and does not specify achieving an RMS roughness of less than about 4 nm, but that Rosswag teaches that mirror gloss would be obtained at higher current densities. The Office Action further states, "It is clear from Rosswag that higher currents result in smooth films; furthermore, there are no negative teachings towards a higher current level than what is disclosed, and therefore one of ordinary skill in the art could achieve as smooth as such as necessary by increasing the current as Rosswag teaches." Applicants reiterate the arguments presented above in regard to Rosswag. Applicants disagree that Rosswag teaches that higher currents result in smooth films. In fact, Rosswag teaches that current density *in the upper range* of 8 – 20 A/dm² results in smoother films. As no result-effective relationship is established by Rosswag, one may not assume that extrapolation beyond this range is valid. Thus, Applicants also disagree with the assertions that it is clear from Rosswag that higher currents result in smooth films, and that there are no negative teachings toward a higher current level than what is disclosed. In fact, there are no teachings at all beyond this defined range and under the limited experimental conditions outlined.

Applicants further note that the amended claims require a current density of at least 0.37 amperes per square centimeter, the resulting tape must have an RMS roughness of less than 1 nm, and a layer of oriented cubic oxide material must be capable of being deposited onto the metallic tape such that the in-plane alignment of the oriented cubic oxide material is less than about 7 degrees. There is no teaching or suggestion in Glowacki, Rosswag or in any of the other

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cited references that this would be possible with the methods known prior to Applicants' invention.

On the basis of the current amendments and for the reasons presented above, Applicants respectfully request that the rejection of claims 1, 4, 5, 7-8, and 13 under Glowacki in view of Rosswag be withdrawn.

3. Rejection of claims 9 and 12 under 35 USC § 103(a) over Glowacki in view of Rosswag, in further view of Drummond (U.S. Patent 2,330,562)
4. Rejection of claims 10 and 11 under 35 USC § 103(a) over Glowacki in view of Rosswag and Drummond, in further view of Tezuka et al. (U.S. Patent 5,843,290)

Claims 9-12 depend from claim 1. Claims 9 and 12 are rejected under 35 USC § 103(a) as obvious over Glowacki in view of Rosswag further in view of Drummond (US 2,330,562). Claims 10 and 11 are rejected under 35 USC § 103(a) as obvious over Glowacki in view of Rosswag further in view of Drummond and further in view of Tezuka (US 5,843,290). Because the prior art fails to render claim 1 obvious, it similarly fails to render claims 9-12 obvious. On the basis of the current amendments and arguments presented herein, Applicants respectfully request reconsideration and withdrawal of these rejections.

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Conclusion

This response represents an earnest effort to place the application in condition for allowance and to distinguish the invention as now claimed from the applied references. In view of the foregoing, reconsideration of this application and allowance of Claims 1, 4, 5 and 9-13 is respectfully requested.

Respectfully submitted,

Date: October 22, 2007
Signature of Attorney

Reg. No. 54,202
Phone (505) 606-2235

Juliet A. Jones, Ph.D.
Los Alamos National Laboratory
LC/IP, MS A187
Los Alamos, New Mexico 87545